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INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter II of the Patent Cooperation Treaty)



(PCT Article 36 and Rule 70)

Applicant's or agent's file reference MJC028BWO	FOR FURTHER ACTION		See Form PCT/PEA/416
International application No. PCT/EP2004/009632	International filing date (day/month/year) 30.08.2004	Priority date (day/month/year) 10.09.2003	
International Patent Classification (IPC) or national classification and IPC B01J8/02, F28D9/00			
Applicant METHANOL CASALE S.A. et al.			

- This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.
- This REPORT consists of a total of 5 sheets, including this cover sheet.
- This report is also accompanied by ANNEXES, comprising:
 - ☒ sent to the applicant and to the International Bureau a total of 1 sheets, as follows:
 - ☐ sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).
 - ☐ sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.
 - ☐ (sent to the International Bureau only) a total of (Indicate type and number of electronic carrier(s)) , containing a sequence listing and/or tables related thereto, in computer readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).

- This report contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the international application
- ☐ Box No. VIII Certain observations on the international application

Date of submission of the demand 04.04.2005	Date of completion of this report 23.12.2005
Name and mailing address of the international preliminary examining authority:  European Patent Office - P.B. 5818 Patentlaan 2 NL-2280 HV Rijswijk - Pays Bas Tel. +31 70 340 - 2040 Tx: 31 651 epo nl Fax: +31 70 340 - 3016	Authorized Officer Vlassis, M Telephone No. +31 70 340-4292 

**INTERNATIONAL PRELIMINARY REPORT
ON PATENTABILITY**

International application No.
PCT/EP2004/009632

Box No. I Basis of the report

1. With regard to the **language**, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.
- ☐ This report is based on translations from the original language into the following language , which is the language of a translation furnished for the purposes of:
- ☐ international search (under Rules 12.3 and 23.1(b))
 - ☐ publication of the international application (under Rule 12.4)
 - ☐ international preliminary examination (under Rules 55.2 and/or 55.3)
2. With regard to the **elements*** of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report)*:

Description, Pages

1-8 as originally filed

Claims, Numbers

1, 2 filed with telefax on 07.12.2005

Drawings, Sheets

1/3-3/3 as originally filed

- ☐ a sequence listing and/or any related table(s) - see Supplemental Box Relating to Sequence Listing
3. ☐ The amendments have resulted in the cancellation of:
- ☐ the description, pages
 - ☐ the claims, Nos.
 - ☐ the drawings, sheets/figs
 - ☐ the sequence listing (*specify*):
 - ☐ any table(s) related to sequence listing (*specify*):
4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).
- ☐ the description, pages
 - ☐ the claims, Nos.
 - ☐ the drawings, sheets/figs
 - ☐ the sequence listing (*specify*):
 - ☐ any table(s) related to sequence listing (*specify*):

* If item 4 applies, some or all of these sheets may be marked "superseded."

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Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims	1,2
	No: Claims	
Inventive step (IS)	Yes: Claims	1,2
	No: Claims	
Industrial applicability (IA)	Yes: Claims	1,2
	No: Claims	

2. Citations and explanations (Rule 70.7):

see separate sheet

Re Item V

1) The amendments filed by the applicant with fax dated 7/12/2005 are considered to comply with the requirements of Art. 34(2)(b) PCT.

2) Claim 1 relates to a chemical reactor with a catalytic bed and a plurality of identical parallel, flat, boxed plate shaped heat exchangers supported therein, the heat exchangers having a specific arrangement inside the reactor shell and centrally defining an axial manhole passage.

The document D1 (EP1153653) is regarded as being the closest prior art to the subject-matter of claim 1. D1 (the references in parentheses applying to this document) discloses two embodiments (see fig. 1 and 3 for first embodiment and fig.4 and 6 for the second embodiment). The first embodiment of D1 (fig. 1 and 3) discloses a reactor with a catalytic bed and a plurality of identical parallel, flat, boxed plate shaped heat exchangers supported therein, the heat exchangers arranged in the specific way of claim 1 of the present application.

The subject-matter of claim 1 differs from the first embodiment known from D1 in that the heat exchangers do not define centrally an axial manhole.

The second embodiment of D1 (fig.4 and 6) discloses a reactor with a plurality of identical flat, boxed plate shaped heat exchangers supported therein, the heat exchangers having a radial arrangement inside the reactor shell and centrally defining an axial manhole passage.

The subject-matter of claim 1 differs from the second embodiment known from D1 in that the heat exchangers are not parallelly arranged but radially arranged and differ thus in the specific arrangement of D1 inside the reactor shell.

The subject-matter of claim 1 is therefore new (Article 33(2) PCT).

The problem to be solved by the present invention may be regarded as ensuring an effective temperature control of the reaction temperature under preudo-isothermal

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(SEPARATE SHEET)**

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conditions within the reaction zone and at the same time allow an easy assembly and maintenance of the reactor and the heat exchangers.

D1 neither discloses nor suggests the combination of the two embodiments and therefore, the solution to this problem proposed in claim 1 of the present application is considered as involving an inventive step (Article 33(3) PCT).

Claim 2 is dependent on claim 1 and as such also meets the requirements of the PCT with respect to novelty and inventive step.

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CLAIMS

1. Axial pseudo-isothermal chemical reactor (1), comprising a substantially cylindrical shell (2), with vertical axis (A-A), closed at the opposite ends by upper (4) and lower (3) bottoms respectively, a reaction zone (8), defined in said shell (2) and in which a catalytic bed (11) and a plurality of flat, boxed, plate-shaped heat exchangers (12), having the shape of a parallelepiped and having vertical long sides (20) and short sides (21) parallel to a same diameter of the shell (2), are supported, characterized in that said exchangers (12) are all identical and in that their short sides (21) have the ends arranged on imaginary cylindrical surfaces (22, 23, 24, 25, 26, 27) having the same radius as the inner radius of the shell (2) and centers all arranged on a same diameter of the shell (2), wherein at least two of said exchangers (12) are arranged on a same imaginary cylindrical surface of said imaginary cylindrical surfaces (22, 23, 24, 25, 26, 27), said plurality of heat exchangers (12) centrally defining an axial manhole passage (19).

2. Chemical reactor according to claim 1, characterized in that said exchangers (12) are arranged on equally spaced parallel planes.

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